5. ANTIDEGRADATION: ROLE OF ECONOMIC ANALYSIS

Under the Water Quality Standards program, each State must develop, adopt and retain a statewide antidegradation policy and establish procedures for its implementation. The antidegradation policy is intended to protect current water quality; in only a limited set of cases can economic grounds be used to allow for a lowering of water quality. In particular, if the quality of the water exceeds levels necessary to support the propagation of fish, shellfish, and wildlife and recreation in and on the water (i.e. "high-quality water"), then economic considerations can be taken into account. Before any lowering of water quality in high-quality waters, however, an antidegradation review must determine that the lowering is necessary in order to accommodate important economic or social development in the area in which the waters are located.

Antidegradation is not a "no growth" rule and was never designed nor intended to be one. It is a policy that allows the public to make decisions about important environmental actions. Where the State intends to provide for development, it may decide that some lowering of water quality in "high-quality waters" is necessary to accommodate important economic or social development. Any such reduction in water quality, however, must protect existing uses fully and must satisfy the requirements for intergovernmental coordination and public participation.

While the terminology is different, the tests to determine substantial and widespread economic impacts (used when removing a use or granting a variance) are basically the same as those used to determine if there might be interference with an important social and economic development (antidegradation). As such, antidegradation analysis is the mirror image of the analyses described in Chapters 2, 3 and 4. Variances and downgrades refer to situations where additional treatment needed to meet standards may result in worsening economic conditions; while antidegradation refers to situations where lowering water quality may result in improved social and economic conditions.

When performing an antidegradation review, the first question is whether the pollution controls needed to maintain the high-quality water will interfere with the proposed development. If not, then the lowering of water quality is not warranted. If, on the other hand, the pollution controls will interfere with development, then the review must show that the development would be an important economic and social one. These two steps rely on the same tests as the determination of substantial and widespread impacts. It should be stressed at the outset that substantial economic impacts does not mean driving profits to zero, nor precluding all other municipal expenditures.

The following sections describe the steps involved in performing an economic impact analysis as part of an antidegradation review. These steps are outlined in Figure 5-1. The analytic approach presented here can be used for a variety of public-sector and private-sector entities, including POTWs, commercial, industrial, residential and recreational land

uses, and for point and nonpoint sources of pollution. The guidance provided in this chapter, however, is not meant to be exhaustive. The State and/or EPA may require additional information or tests. In addition, the applicant should feel free to include any additional information they feel is relevant. The steps described in further detail in the rest of the chapter are:

- **Verify Project Costs and Calculate the Annual Cost of the Pollution Control Project** - This section describes the factors considered when verifying that the proposed pollution control project is the most appropriate solution and the type of information that should be provided about the proposed project. It discusses how to annualize capital costs of the project and calculate total annual costs of the pollution control project.

- **Determine if Requirements would Interfere with Development (i.e., lower water quality is "necessary")** - This section describes the types of financial tests that should be used to determine if maintaining the high-quality water would interfere with the development.

- **Determine if Economic and Social Development would be Important** - This section presents factors to be considered in determining whether the development would be important from an economic and social point of view.

These steps closely parallel the analytic techniques presented in Chapters 2, 3, and 4. These chapters should be read for more detail.

5.1 Verify Project Costs and Calculate The Annual Cost of the Pollution Control Project

Before the impact analysis can be performed, the project costs should be verified and the annual costs calculated. Both private-sector and public-sector entities should consider a broad range of discharge management options including pollution prevention, end-of-pipe treatment, and upgrades or additions to existing treatment.

Whatever approach, the discharger must demonstrate that the proposed project is the most appropriate means of meeting water quality standards and must document project cost estimates. If there is at least one of the treatment alternatives that allows the applicant to maintain high-quality water without incurring substantial impacts, then they have failed to show that the requirements would interfere with the development. Cost information, and the assumptions underlying the cost estimates, should be supplied on Worksheet O.

The following two sections (5.1.a and 5.1.b) discuss analyzing public-sector projects. Section 5.1.c discusses private sector projects.

5.1.a Public-Sector Developments: Calculate the Annual Costs of the Pollution Control Project

Since capital costs typically will be paid over several years, annualized costs are used in the evaluation of economic burden to the community. The capital portion of public-sector project costs is typically financed over approximately 20 years, by issuing a municipal debt instrument such as a general obligation bond or a revenue bond.

The calculation of total annualized cost of the project is presented in **Worksheet P**. First, capital costs are summed and the portion of costs to be paid for with grant monies are deducted, as these costs will not need to be financed. Next, the annualization factor is calculated using the formula supplied on **Worksheet P**, or the annualization factor is found in Appendix B. Annualized capital cost is then calculated by multiplying the total capital costs to be financed by the annualization factor.

The interest rates used to annualize costs are dependent on the type of debt instrument used as well as the issuer's credit standing. Therefore, the interest rate used on **Worksheet P** reflects the debt instrument (i.e. municipal bond, commercial bank loan, state revolving fund loan, or other instrument) likely to be used by the municipality.

Next, annual operating and maintenance costs are added to the annualized capital cost. O&M costs should include the costs of monitoring, inspection, permitting fees, waste disposal charges, repair, administration, replacement, and any other recurring costs. All recurring costs should be stated in terms of dollars per year. The sum of the annualized capital cost and total annual operating and maintenance costs is the total annual cost of the project.

5.1.b Public-Sector Developments: Calculate Total Annualized Pollution Control Costs Per Household

To assess the burden that total pollution control costs are expected to have on households, an average annualized pollution control cost per household should be calculated for all households in the community that would bear project costs. In order to evaluate substantial impacts, therefore, the analysis must establish which households will actually pay for pollution control and what proportion of the costs will be borne by households. Then, these apportioned project costs are added to existing pollution control costs paid by the households.

It is important to define the affected community. The "community" is the governmental jurisdiction or jurisdictions responsible for paying compliance costs.

If project costs were estimated for some prior year, these costs should be adjusted upward to reflect current year prices using the average annual national Consumer Price

Index (CPI) inflation rate for the period. The CPI inflation rate is available from the Bureau of Labor Statistics. An additional source reporting the CPI inflation rate is the *CPI Detailed Report*, which is published monthly by the U.S. Department of Labor, Bureau of Labor Statistics.

In calculating the total annual cost of pollution control per household, current costs of pollution control must be considered along with the projected annual costs of the proposed pollution control project. The existing cost per household usually can be obtained from the most recent municipal records. For example, use the most recent operating revenues of the sewer enterprise fund, divided by the number of households served. If the portion of proposed project costs that households are expected to pay is known or is expected to remain unchanged, then use **Worksheet Q** to calculate the total annual cost of pollution control per household. If the portion paid by households is based on flow, then should refer to **Worksheet Q: Option A** as well.

5.1.c Private-Sector Entities: Calculate the Annual Costs of the Pollution Control Project

As with public-sector investments, the total capital costs are usually spread out over several years. Annualization calculates the amount that will be paid each year, including the financing costs. In order to allow for comparisons across cases, the analysis should assume that the applicant will borrow the capital and repay the loan in even annual installments over a 10 year period. The assumption of ten years is based on the likely life of the equipment. The assumption of even annual installments is made for convenience. The interest rate on the loan should be equivalent to the rate the applicant pays when it borrows money.

The financial tests discussed below compare the costs of compliance to other costs and revenues of the applicant. Compliance costs and other costs and revenues must, therefore, be calculated for the same year. See discussion in Section 2.2, and Appendix A for references to inflation/deflation indices. The Annualized Cost of Pollution Control for a private-sector entity can be calculated using **Worksheet R**.

5.2 Financial Analysis to Determine if Lower Water Quality is "Necessary"

The purpose of the financial impact analysis is to assess the extent to which planned development will be reduced as a result of maintaining water quality. There are two sets of tests presented in this section: one set for publicly owned developments, such as POTWs, and another for privately owned developments, such as new manufacturing facilities. The tests are not designed to determine the exact impact of pollution control costs on an entity. They merely provide indicators of whether pollution control costs would result in a substantial impact.

5.2.a Public-Sector Developments: Calculate and Evaluate the Municipal Preliminary Screener Value

Whether or not maintaining high-quality water is likely to interfere with a development due to additional public-sector costs is determined by jointly considering the results of two tests. The first test is a "screener" to establish whether the community can clearly pay for the project. The Municipal Preliminary Screener estimates the total per household annual pollution control costs to be borne by households (existing costs plus those attributable to the proposed project) as a percentage of median household income. The screener is written as follows:

$$Municipal\,Preliminary\,Screener = \frac{Average\,Total\,Pollution\,Control\,Cost\,per\,Household}{Median\,Household\,Income}$$

Median household income information for many municipalities is available from the 1990 Census of Population. To estimate median household income for the current year, use the CPI inflation rate for the period between the year that median household income is available and the current year.

Depending on the results of the screener, the community is expected to incur small, mid-range, or large economic impacts (see **Worksheet S**). If the total annual cost per household (existing annual cost per household plus the incremental cost related to the proposed project) is less than 1.0 percent of median household income, then the requirements are not expected to impose a substantial economic hardship on households and would not interfere with the development.

Communities are expected to incur mid-range impacts when the ratio of total annual compliance costs to median household income is between 1.0 and 2.0 percent. If the average annual cost per household exceeds 2.0 percent of median household income, then the project may place a large financial burden on many of the households within the community and the requirements may interfere with the development. In either case, communities move on to the Secondary Test to demonstrate substantial impacts.

5.2.b Public-Sector Developments: Secondary Test

The Secondary Test is designed to build upon the characterization of community identified in the Municipal Preliminary Screener. The Secondary Test indicates the community's ability to obtain financing and describes the socioeconomic health of the community. Indicators describe precompliance debt, socioeconomic, and financial management conditions in the community. Using these indicators and the scoring system

described below, the impact of the cost of pollution control is estimated. Specifically, applicants are required to present the following six indicators for the community:

Debt Indicators

- Bond Rating (if available) - a measure of credit worthiness of the community;

- Overall Net Debt as a Percent of Full Market Value of Taxable Property - a measure of debt burden on residents within the community;

Socioeconomic Indicators

- Unemployment Rate - a measure of the general economic health of the community;

- Median Household Income - a measure of the wealth of the community;

Financial Management Indicators

- Property Tax Revenue as a Percent of Full Market Value of Taxable Property - a measure of the funding capacity available to support debt based on the wealth of the community; and

- Property Tax Collection Rate - a measure of how well the local government is administered.

A more detailed description of the six indicators is presented in Section 2.4, including a discussion of alternative measures to use in States with property tax caps and limitations on assessed values. **Worksheet T** can be used to estimate each of the indicators. Table 5-1 summarizes the indicators and what is considered to be a strong, mid-range, or weak rating.

The Secondary Score is calculated for the community by weighting each indicator equally and assigning a value of 1 to each indicator judged to be weak, a 2 to each indicator judged to be mid-range, and a 3 to each strong indicator. A cumulative assessment score is arrived at by summing the individual scores and dividing by the number of factors used. **Worksheet U** guides the reader through this calculation. The cumulative assessment score is evaluated as follows:

- less than 1.5 is considered weak
- between 1.5 and 2.5 is considered mid-range
- greater than 2.5 is considered strong

If the applicant is not able to develop one or more of the six indicators, they must provide an explanation as to why the indicator is not appropriate or not available. Since the point of the analysis is to measure the overall burden to the community, the debt and socioeconomic indicators are assumed to be better measures of burden than the financial management indicators. Consequently, if one of the debt or socioeconomic indicators is not available, the applicant should average the two financial management indicators and use this averaged value as a single indicator with the remaining indicators. This averaging is necessary so that undue weight is not given to the financial management indicators.

5.2.d Public-Sector Developments: Assess Whether the Requirements Would Interfere With the Development

The results of the two tests are considered jointly in determining whether the community is expected to incur substantial impacts that would interfere with the development. As shown in Table 5-2, the cumulative assessment score for the community is combined with the estimated household burden. The combination of factors establishes whether impacts can be expected to be substantial.

In the matrix, "X" indicates that the impact is likely to interfere with the development. The closer the community is to the upper right hand corner of the matrix, the greater the likelihood. Similarly, "✓" indicates that the impact is not likely to interfere with development. The closer to the lower left hand corner of the matrix, the smaller the likelihood. Finally, the "?" indicates that the impact is unclear.

5.2.e Private-Sector Developments: Financial Measures

Four general categories of financial tests are used to determine if maintaining high-quality water will interfere with privately owned development. The four categories are divided into a primary measure of financial impacts and three secondary measures of financial impacts:

Primary Measure

- Profit -- how much would profits decline due to pollution control expenditures?

Secondary Measures

- Liquidity -- how easily can an entity pay its short-term bills?
- Solvency -- how easily can an entity pay its fixed and long-term bills?
- Leverage -- how much money can the entity borrow?

Profit and solvency ratios are calculated both with and without the additional compliance costs (taking into consideration the entity's ability, if any, to increase its prices to cover

part or all of the costs). Comparing these ratios to each other and to industry benchmarks provides a measure of the impact on the entity. Since antidegradation reviews involve new or expanded operations, the ratios often will be calculated using estimated values from pro-forma income statements and balance sheets prepared for the development.

For all of the tests, it is important to look beyond the individual test results and evaluate the total situation of the entity. While each test addresses a single aspect of financial health, the results of the four tests should be considered jointly to obtain an overall picture. The results should be compared with the ratios for other entities in the same industry or activity.

The primary and secondary measures are described below, along with an example of specific tests to be used. While there are several ratios that could be used for each test, to simplify the presentation only one ratio per test is described. In most cases, interpreting the results requires comparisons with typical values for the industry. Among the sources that provide comparative information are: Robert Morris Associates' *Annual Statement Studies*, *Moody's Industrial Manual*, Dun and Bradstreet's *Dun's Industry Norms*, and Standard & Poor's *Industry Surveys*. The *Annual Statement Studies*, *Dun's Industry Norms* , and Standard & Poor's *Industry Surveys* provide composite statistics for firms grouped into various manufacturing and service industries. The *Moody's Industrial Manual* provides detailed financial information on individual firms that can be used for comparison purposes. Each of the tests is discussed in more detail in Chapter 3.

5.2.f Private-Sector Developments: Primary Measure

Primary measure is the Profit Test, which measures the development's earnings if it is required to provide pollution control necessary to maintain the high-quality waters and if it is not required to do so. If maintaining high-quality water would result in considerably lower profits, then the development might not take place.

Two pieces of information are needed for the Profit Test. The first piece is the total annual cost of the required pollution control from **Worksheet R**. The second piece is the earnings information from the entity's income statement (**Worksheet V**).

$$Profit\ Test = \frac{Earnings\ Before\ Taxes}{Revenues}$$

The Profit Test should be calculated with and without the cost of the pollution control. In the former case, the annualized cost of pollution control (including O&M) is subtracted from the discharger's estimated earnings before taxes (revenues minus costs excluding income taxes). The Profit Test can be calculated using **Worksheets V, and W**. These profit rates should be

compared to those for facilities in similar lines of business, using data in *Moody's Industrial Manual*, *Dun & Bradstreet's Industry Norms and Key Business Ratios*, *Standard & Poor's Industry Surveys*, or Robert Morris's *Annual Statement Studies*.

The degree to which the discharger is able to raise prices is difficult to predict, and depends on many factors. Considerations should include the level of competition in the industry, the likelihood of competitors' facilities facing similar project costs, and the willingness of consumers to pay more for the product.

5.2.g Private-Sector Developments: Secondary Measures

The following secondary measures provide additional important information about the financial health of the development. All primary and secondary measures should be included in the analysis.

Liquidity

Liquidity is a measure of how easily a discharger can pay its short-term bills. One measure of liquidity is the Current Ratio, which compares current assets with current liabilities. Current assets include cash and other assets that are or could reasonably be converted into cash during the current year. Likewise, current liabilities are items that must be paid within the current year.

The Current Ratio is calculated by dividing current assets by current liabilities.

$$Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilities}$$

The Current Ratio can be calculated using **Worksheet X**. The general rule is that if the Current Ratio is greater than 2, the entity should be able to cover its short-term obligations. Frequently, lenders require this level of liquidity as a prerequisite for lending. This rule (Current Ratio > 2) may not, however, be appropriate for all types of private entities. The Current Ratio of the discharger in question should be compared with ratios for other dischargers in the same line of business.

Solvency

Solvency is a measure of an entity's ability to meet its fixed and long-term obligations. These obligations are bills and debts that are owed on a regular basis for periods longer than one year. Solvency tests are commonly used to predict financial problems that could lead to bankruptcy within the next few years.

As with liquidity, there are several possible tests for solvency. One solvency test, the Beaver's Ratio, compares cash flow to total debt. This test has been shown to be a good indicator of the likelihood of bankruptcy.

$$Beaver's\ Ratio = \frac{Cash\ Flow}{Total\ Debt}$$

The Beaver's Ratio can be calculated using **Worksheet Y**. Cash Flow is a measure of the cash the entity has available to it in a given year. Since depreciation is an accounting cost -- a cost that does not use any currently available revenues -- it is added back to reported net income after taxes to get cash flow. Total debt is equal to the current debt for the current year plus the long term debt, since current debt includes that part of long-term debt that is due in the current year.

If the Beaver's Ratio is greater than 0.20 the development is considered to be solvent (i.e., can pay its long-term debts). If the ratio is less than 0.15 the development may be insolvent (i.e., go bankrupt). If the ratio is between 0.15 and 0.20, then future solvency is uncertain.

Leverage

Leverage tests measure the extent to which a firm has fixed financial obligations and thus indicates how much more money a firm is capable of borrowing. Firms that rely heavily on debt may find it difficult and expensive to borrow additional funds. One commonly used measure of leverage is the Debt to Equity Ratio.

$$Debt/Equity\ Ratio = \frac{Long\text{-}Term\ Liabilities}{Owners' Equity}$$

The Debt to Equity Ratio can be calculated using **Worksheet Z**. Since there are no generally accepted Debt/Equity Ratio values that apply to all types of economic activity, the ratio should be compared with the ratio of firms in similar businesses. If the entity's ratio compares favorably with the median or upper quartile ratio for similar businesses, it should be able to borrow additional funds. These ratios can be calculated using data in Robert Morris Associates' *Annual Statement Studies*, *Moody's Industrial Manual*, and Dun & Bradstreet's *Dun's Industry Norms*.

For entities with special sources of funding, leverage is not an appropriate measure of their ability to raise capital. Examples are agriculture and affordable housing, where special loan programs may be available. In these cases, an analysis of the probability that the project would receive this money is appropriate.

5.2.g Private-Sector Developments: Assess Whether the Requirements Will Interfere With the Development: Interpreting the Results

The financial analysis should be used to determine if there will be a substantial adverse impact such as to interfere with the development. If the four tests taken together indicate that the requirements would interfere with the development, then proceed to Section 5.3 to determine if the development would be considered important in social and economic terms.

5.3 Determine If Economic and Social Development Would Be Important

There are no economic ratios per se that determine whether a development would be considered important. Instead, the relative magnitudes of indicators such as increases in unemployment, losses to the local economy, changes in household income, decreases in tax revenues, indirect effects on other businesses, and increases in sewer fees should be taken into account. The term important is intended to convey a general concept regarding the level of social and economic development used to justify a change in high-quality waters.

5.3.a Define Relevant Geographical Area

One important factor is defining the geographical area in which the impacts will occur. In the case of municipal pollution control projects, the affected community is most often the immediate municipality. The relevant geographic area for evaluating the importance of a private-sector development varies with each situation. The area will typically be determined by the area in which the majority of its workers live and where most of the businesses that depend on it are located. In either case, the geographical area considered must include "...the area in which the waters are located." (40 CFR 131.12 (a)(2)) There are no simple rules for defining the relevant area or community; the decision is based on the judgement of the applicant and state, subject to EPA review.

5.3.b Public-Sector Developments: Determine Whether Important

While there are no explicit criteria, it is recommended that changes in the socioeconomic indicators listed below be considered. For each indicator listed, the applicant should estimate the potential change that would result from the development.

- Median Household Income;
- Community Unemployment Rate;
- Overall Net Debt as a Percent of Full Market Value of Taxable Property;
- Percent of Households Below Poverty Line;
- Impact on Community Development Potential; and
- Impact on Property Values.

Estimated changes should be provided, along with supporting discussions, on **Worksheet AA**.

5.3.c Private-Sector Developments: Determine Whether Important

Determination of whether or not a private-sector development will be important to a community requires exploring more factors than is the case with public-sector developments. **Worksheet AB** has been provided to assist applicants in their evaluation of socioeconomic impacts. It is designed as a list of the factors applicants should consider in determining whether the development is important. Applicants should feel free, however, to add anecdotal information to describe any current community characteristics or anticipated impacts that are not listed in the worksheet.

Potentially, one of the most important impacts on the affected community's economy is the employment to be gained. The size of this impact is dependent on the number of new jobs relative to the total number of jobs in the community, and to the other job opportunities available in the community. Typically, an increase in employment leads to an increase in personal income in the affected community. The total amount of income gained by the affected community will depend, in part, on the other job prospects of those hired. To assess the net impact on employment in the affected community, the existing rate of unemployment should be considered as an indicator of worker mobility between jobs.

The analysis should also consider whether the increase in employment opportunities may lead to a decreased need for social services in the affected community. If the cost of savings for decreased social services will be borne by the affected community, they should be included in the assessment.

The effects of increased employment and personal income will be compounded as the money moves through the economy. This multiplier effect means that each dollar gained to an employee results in the gain of more than a dollar to the local economy. Multiplier effects are discussed in more detail in Section 4.4.

Socioeconomic impacts may also include effects on the local government(s) such as property tax revenues and the demand for other public services. For example, if the development would be paying a share of the cost to upgrade a municipal treatment plant, then the analysis of community impacts is more complicated. If the development is eliminated, the system may become excessively expensive for the remaining users.

5.4 Summary

Using the guidance described in this document, the applicant must demonstrate that the pollution control measures needed to maintain the high-quality waters will interfere

with the development. In addition, the applicant will have to show that the development is important to the community.

The tests used to demonstrate interference and importance are the same as those used to demonstrate substantial and widespread. The difference is, however, that an antidegradation review considers situations that would improve the economic condition.